

Having described the invention, the following is claimed:

1. A switch assembly comprising:

a housing; and

a set of contacts supported by said housing, said set of contacts comprising a first contact and a second contact;

said first contact including a first pad portion supported in said housing and a first connector portion protruding from said housing, said first connector portion comprising a first compliant connector;

said second contact including a second pad portion supported in said housing, said second pad portion being movable relative to said first pad portion and engageable with said first pad portion, said second contact also including a second connector portion protruding from said housing, said second connector portion comprising a second compliant connector.

2. The switch assembly as recited in claim 1, wherein said second contact further includes a spring portion and an actuator portion, said spring portion being deflectable relative to said housing when a force acts on said actuator portion, said second pad portion being

movable relative to said first pad portion when said spring portion deflects relative to said housing.

3. The switch assembly as recited in claim 2, wherein said set of contacts are normally closed, said spring portion biasing said second pad portion into engagement with said first pad portion, said spring portion being deflectable when a force acts on said actuator portion to an actuated condition wherein said second pad portion is disengaged from said first pad portion.

4. The switch assembly as recited in claim 2, wherein said set of contacts are normally opened, said spring portion biasing said second pad portion to disengage from said first pad portion, said spring portion being deflectable when a force acts on said actuator portion to an actuated condition wherein said second pad portion is engaged with said first pad portion.

5. The switch assembly as recited in claim 2, wherein actuator portion comprises a cam protruding from said housing, said cam having a cam surface.

6. The switch assembly as recited in claim 5, wherein said first and second connectors extend transversely from a bottom wall of said housing, said cam protruding from a top wall of said housing opposite said bottom wall.

7. The switch assembly as recited in claim 5, wherein said first and second connectors extend transversely from a bottom wall of said housing, said cam protruding from a side wall of said housing, said side wall extending transverse to said bottom wall.

8. The switch assembly as recited in claim 5, further comprising an actuator movable relative to said housing and said set of contacts, said actuator comprising at least one actuating member with at least one actuating portion movable into engagement with said cam surface to move said actuator portion and cause deflection of said spring portion which moves said second pad portion relative to said first pad portion.

9. The switch assembly as recited in claim 8, wherein said actuator comprises a rotary actuator rotatable relative to said housing and said set of

contacts about an axis, said at least one actuating member being movable into engagement with said cam surface upon rotation of said rotary actuator to move said actuator portion and cause deflection of said spring portion which moves said second pad portion relative to said first pad portion.

10. The switch assembly recited in claim 8, comprising a plurality of sets of contacts, said actuator comprising a plurality of actuator members, each of said actuator members corresponding to one of said sets of contacts and including at least one actuating portion for actuating said corresponding one of said sets of contacts.

11. The switch assembly recited in claim 10, wherein said plurality of sets of contacts and said actuator form a multiplexed or encoded switch wherein said actuator members are arranged to actuate said sets of contacts in a plurality of predetermined combinations depending on the position of said actuator relative to said housing.

12. The switch assembly recited in claim 10, wherein said plurality of sets of contacts each include a first contact and a second contact, each of said first contacts

being made individually as single pieces of electrically conductive material, said second contacts being made as one single piece of electrically conductive material.

13. The switch assembly as recited in claim 1, wherein said first contact and said second contact each are made from a single piece of electrically conductive material.

14. The switch assembly as recited in claim 13, wherein said first contact includes a latch portion formed from said single piece of electrically conductive material forming said first contact and said second contact includes a latch portion formed from said single piece of electrically conductive material forming said second contact, each said latch portion comprising a deflectable member having a spring bias, said latch portions being biased into engagement with respective portions of said housing to releasably latch onto said housing and help connect said first and second contacts to said housing.

15. The switch assembly as recited in claim 1, wherein each of said first and second compliant connectors comprises spaced retainer members insertable into a hole

for receiving said compliant connectors, said hole having an inner side wall, said retainer members having outer surfaces that engage said inner side wall and form an interference fit with said hole when inserted in said hole, said retainer members deflecting toward each other when inserted in said hole, said retainer members having a spring bias that biases said retainer members against said inner side wall to frictionally engage said inner side wall.

16. The switch assembly as recited in claim 15, wherein each of said compliant connectors further comprises a cross member extending transverse to said retainer members, said cross members including portions engageable with a surface surrounding said hole to limit insertion of said retainer members in said hole.

17. The switch assembly as recited in claim 1, further comprising first and second contact pads constructed of a precious metal alloy, said first contact pad being fastened to said first pad portion and said second contact pad being fastened to said second pad portion.

18. The switch assembly recited in claim 1, wherein at least one of said first and second connector portions comprises a plurality of compliant connectors.

19. The switch assembly recited in claim 1, further comprising an actuator supported in said housing and movable relative to said contacts, said actuator having a portion in abutting engagement and a portion protruding from said housing, said actuator being movable to cause deflection of said second contact which causes actuation of said first and second contacts.

20. A switch assembly comprising:  
a housing;  
a plurality of sets of contacts supported by said housing, said sets of contacts each comprising a first contact and a second contact;  
said first contacts each including a first pad portion supported in said housing and a first connector portion protruding from said housing, said first connector portion comprising a first compliant connector;  
said second contacts each including a second pad portion supported in said housing, said second pad portion being movable relative to said first pad portion and

engageable with said first pad portion, said second contact also including a second connector portion protruding from said base portion, said second connector portion comprising a second compliant connector; and

an actuator movable relative to said housing and said at least one set of contacts, said actuator comprising at least one actuating member movable into engagement with said second contacts to move said second pad portions relative to said first pad portions.

21. The switch assembly as recited in claim 20, further comprising a plurality of first and second contact pads each constructed of a precious metal alloy, each of said first pad portions having one of said first contact pads fastened thereto, each of said second pad portions having one of said second contact pads fastened thereto.

22. A rotary switch assembly comprising:

a housing;  
at least one set of contacts supported by said housing, said at least one set of contacts each comprising a first contact and a second contact, each of said first contacts including a first pad portion supported in said housing and a first connector portion protruding from said

housing, said first connector portion comprising a compliant connector;

each of said second contacts including a second pad portion supported in said housing and a second connector portion protruding from said housing, said second connector portion comprising a compliant connector, said second pad portion being movable relative to said first pad portion and engageable with said first pad portion, said second contact further including a deflectable spring portion and an actuator portion that protrudes from said housing, said actuator portion including a cam surface; and

a rotary actuator rotatable relative to said housing and said at least one set of contacts, said rotary actuator comprising at least one actuating portion movable upon rotation of said actuator into engagement with said cam surface to cause deflection of said spring portion and move said second pad portion relative to said first pad portion.

23. A rotary switch assembly comprising:

a housing having a first surface and an opposite second surface;

at least one set of contacts supported by said housing, said at least one set of contacts each comprising a first contact and a second contact, each of said first contacts including a first pad portion supported in said housing and a first connector portion protruding from said second surface of said housing, said first connector portion comprising a compliant connector;

each of said second contacts including a second pad portion supported in said housing and a second connector portion protruding from said second surface of said housing, said second connector portion comprising a compliant connector, said second pad portion being engageable with said first pad portion and movable relative to said first pad portion from a non-actuated condition to an actuated condition, said second contact further including a deflectable spring portion and an actuator portion that protrudes from said first surface of said housing, said actuator portion including a cam surface; and

a rotary actuator rotatable relative to said housing and said at least one set of contacts, said actuator comprising at least one actuating member presented toward said first surface of said housing, said at least one actuating member being movable upon rotation

of said actuator into engagement with said cam surface to cause deflection of said spring portion and move said second pad portion relative to said first pad portion from said non-actuated condition to said actuated condition.

24. Apparatus for controlling a vehicle device having a plurality of modes of operation, said apparatus comprising:

a printed circuit board with plated through holes electrically connected with an electrical circuit;

a controller operatively connected to said electrical circuit and operatively connected to the vehicle device; and

a switch assembly comprising:

a housing;

a plurality of set of contacts supported by said housing, said sets of contacts each comprising a first contact and a second contact, each of said first contacts including a first pad portion supported in said housing and a first connector portion protruding from said housing, each of said first connector portions comprising a compliant connector inserted into one of said plated through holes to electrically connect said first contacts to said electrical circuit;

each of said second contacts including a second pad portion supported in said housing and a second connector portion protruding from said housing, each of said second connector portions comprising a compliant connector inserted into one of said plated through holes to electrically connect said second contacts to said electrical circuit, said second pad portions each being movable relative to and engageable with a corresponding one of said first pad portions, each of said second contacts further including a deflectable spring portion and an actuator portion that protrudes from said housing, said actuator portion including a cam surface; and

an actuator movable relative to said housing and said at least one set of contacts to a plurality of positions, said actuator comprising at least one actuating member movable with said actuator into engagement with said cam surfaces to cause deflection of said spring portions and move said second pad portions relative to said first pad portions, said actuator actuating predetermined combinations of said sets of contacts at each of said positions, said controller receiving signals from said switch assembly via said electrical circuit, said signals corresponding to said predetermined combination and being operative to actuate the vehicle

devices to one of the modes of operation according to said predetermined combination.

25. A side actuated switch assembly comprising:

a housing having a bottom wall and at least one side wall extending transversely from said bottom wall; and

a set of contacts supported by said housing, said set of contacts comprising a first contact and a second contact;

said first contact including a first pad portion supported in said housing and a first connector portion protruding from said bottom wall of said housing, said first connector portion comprising a first compliant connector;

said second contact including a second pad portion supported in said housing and an actuator portion protruding from said side wall, said second pad portion being engageable with said first pad portion, said second pad portion being movable relative to said first pad portion when a force acts on said actuator portion, said second contact also including a second connector portion protruding from said bottom wall of said housing, said

second connector portion comprising a second compliant connector.

26. A switch assembly comprising:

a housing;

a first contact supported in said housing, said first contact comprising a compliant connector portion;

a first contact pad fastened to said first contact, said first contact pad being constructed of a precious metal alloy;

a second contact supported in said housing and movable relative to said first contact, said second contact comprising a compliant connector portion; and

a second contact pad fastened to said second contact, said second contact pad being constructed of a precious metal alloy.

27. The switch assembly recited in claim 26, wherein said first contact pad is constructed of a silver-nickel alloy and said second contact pad is constructed of a silver-tin oxide.

28. The switch assembly recited in claim 27, wherein said second contact further comprises an actuator portion

for receiving a force for causing deflection of said second contact to move said second contact pad relative to said first contact pad.

29. The switch assembly recited in claim 26, wherein said first and second contact pads are fastened to said first and second contacts by at least one of stamping, staking, press-fitting, riveting, soldering, and welding.

30. The switch assembly recited in claim 26, wherein said first and second contact pads are capable of switching electrical currents of up to about 14 amperes without arcing.

31. The switch assembly recited in claim 26, wherein said first contact pad has a cylindrical configuration with a flat first contact surface and said second contact pad has a domed configuration with a domed second contact surface, said first and second contact surfaces being engageable with each other to permit electrical current to flow between said first and second contact pads.

32. The switch assembly recited in claim 31, wherein said domed second contact surface provides a wiping action

against said flat first contact surface when said switch assembly is actuated.

33. The switch assembly recited in claim 26, wherein said compliant connector portions of at least one of said first and second contacts comprise a plurality of compliant connector pins.